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None

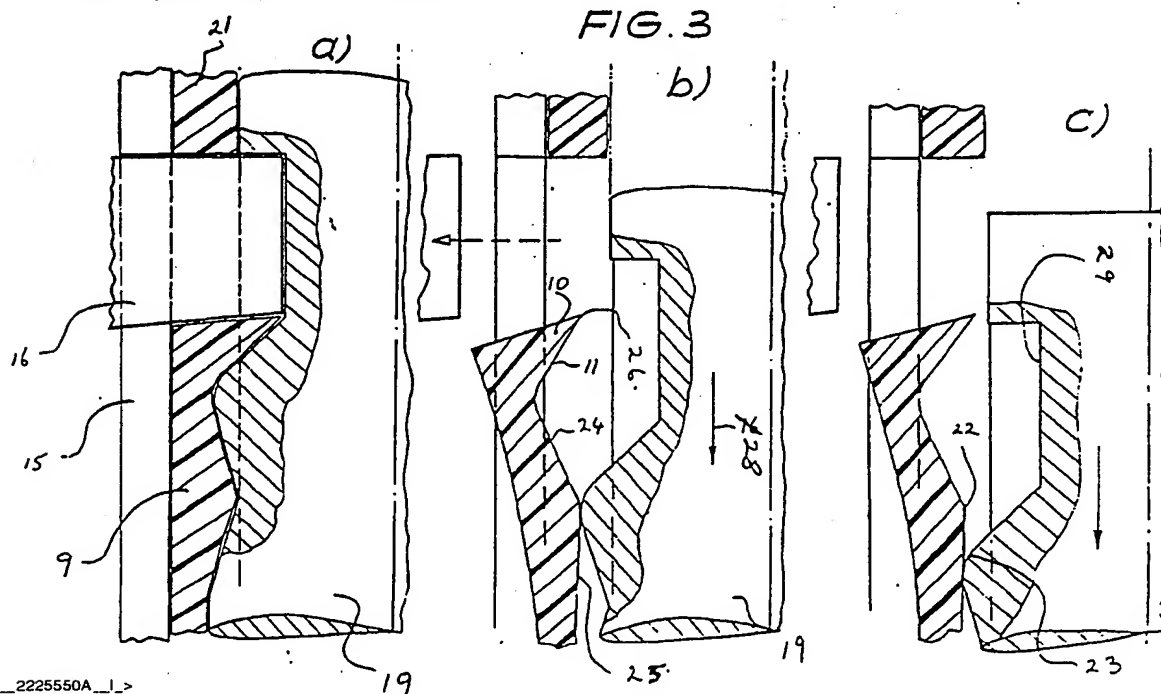
(58) Field of search

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(54) Method of moulding

(57) In the moulding of eg a connector for corrugated piping, the connector is formed with a longitudinal bore, a recess communicating with the bore, and a longitudinally extending finger (9) positioned in the recess with a projection (10) extending into the bore. The finger (9) also has on its underside a transversely extending ridge (22) with a valley between the projection (10) and the ridge (22). The mould confirms a central core (19) to form the bore and the underside of the finger (9) and a movable side mould (16) for the recess. After the side mould (16) is withdrawn the central core (19) can be withdrawn by camming-out the finger (9).



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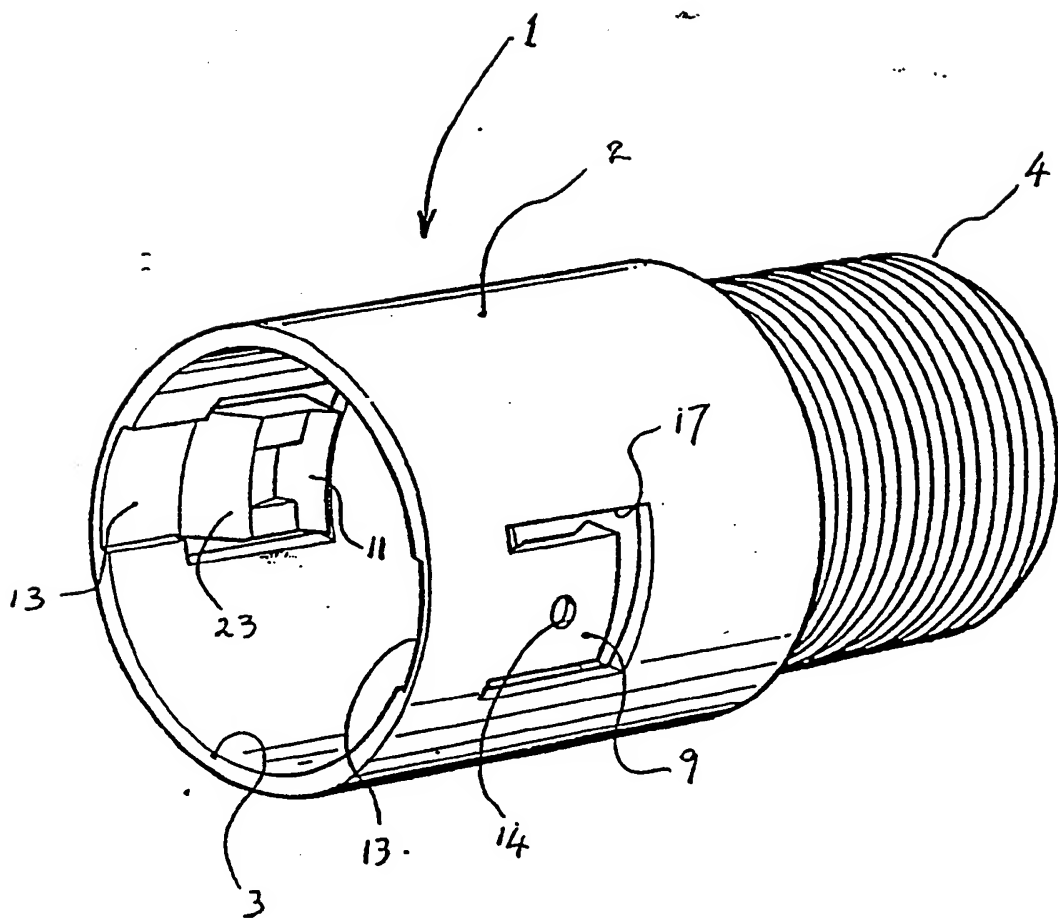
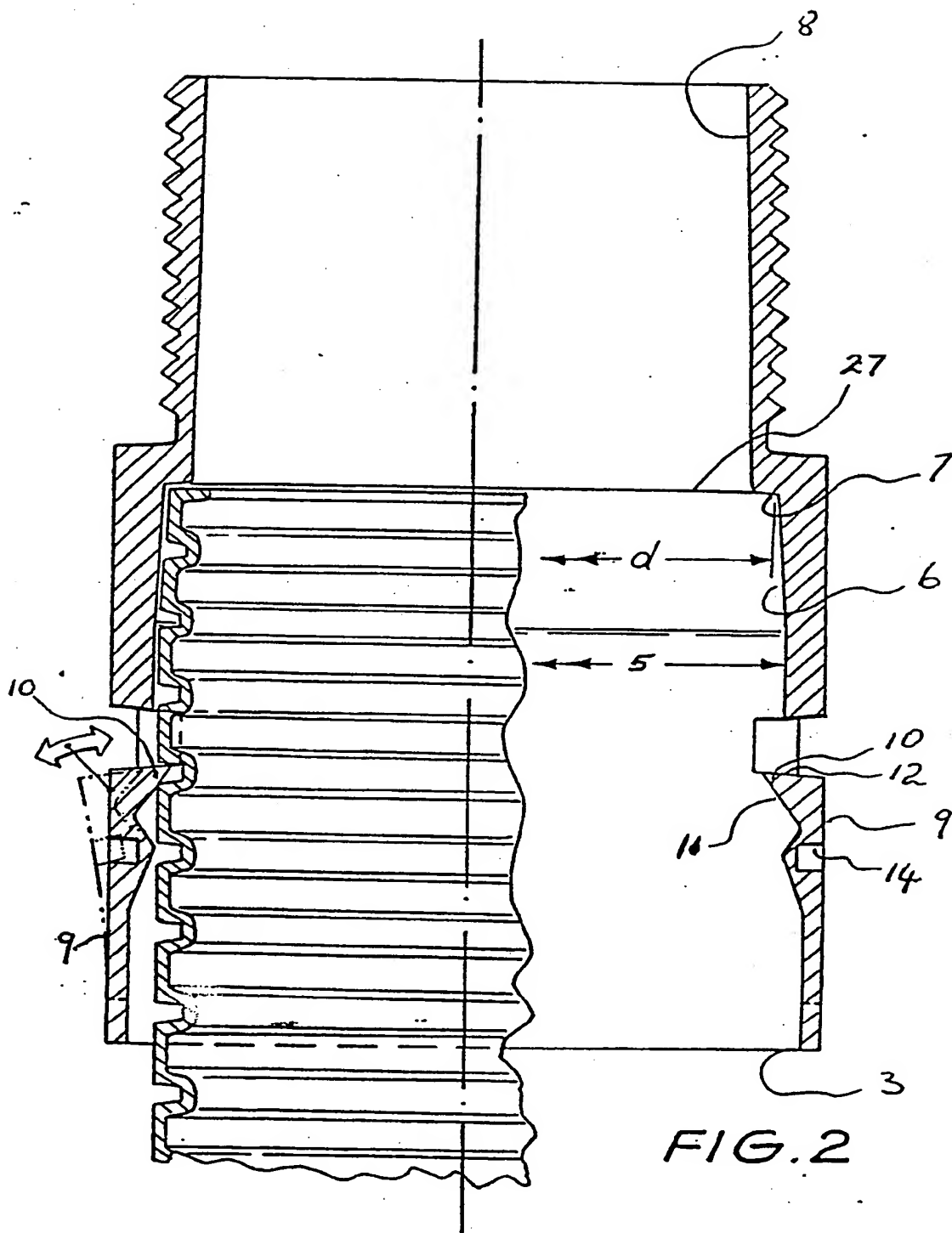
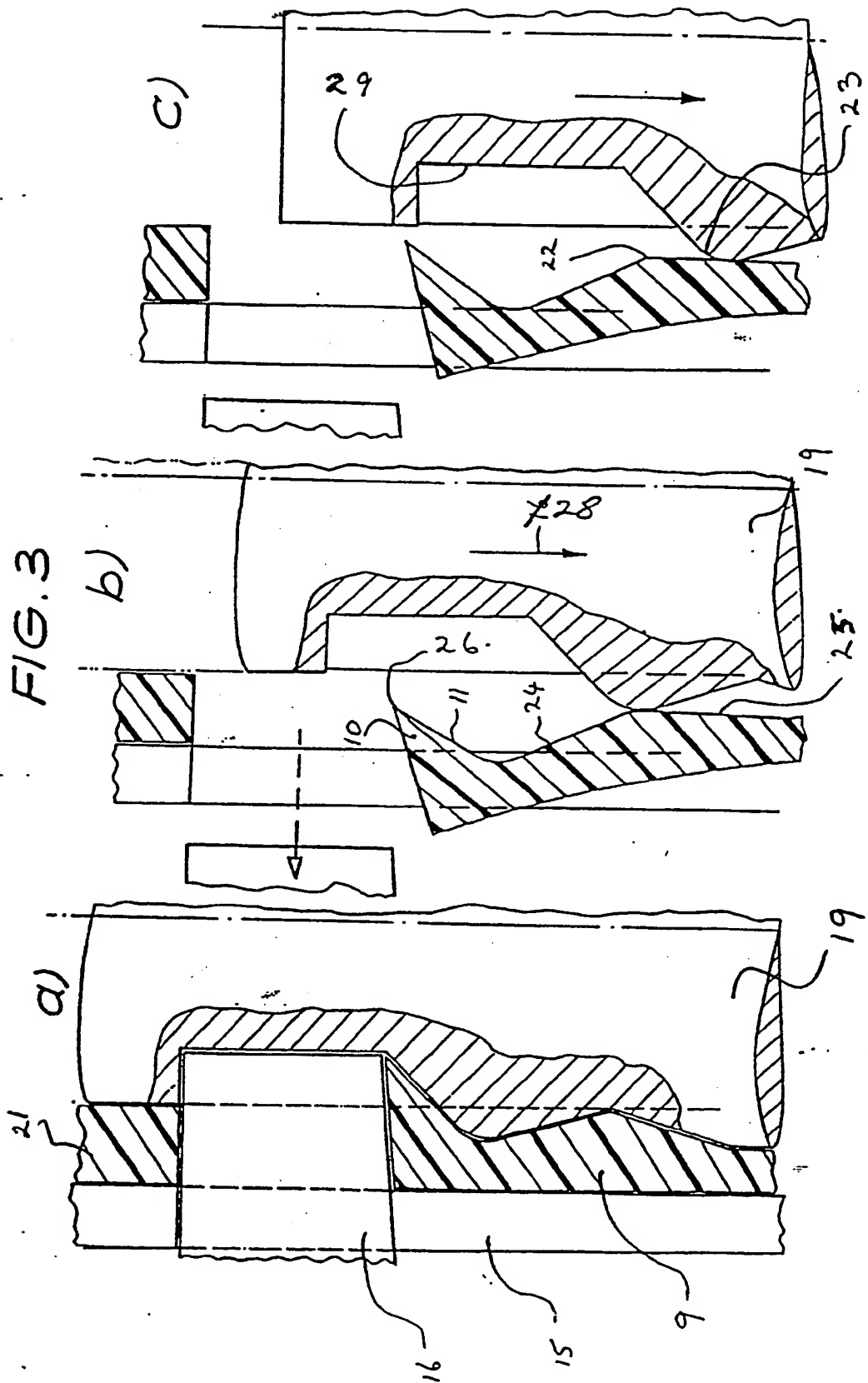


FIG. 1



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Method of Moulding

The present invention relates to a method of moulding a hollow one-piece plastics article with an internal projection, and in particular to a method of moulding a one-piece hollow plastics article with a projection extending internally from a longitudinally extending finger.

Examples of such articles are connectors for corrugated piping or conduit.

In one broad form the invention comprises a method of moulding of a hollow one-piece plastics article having a longitudinal bore, with a recess in said article communicating with said bore (5), and longitudinally extending finger (9) positioned in said recess (17) with a projection (10), extending into said bore (5) and having on its underside a substantially transversely extending ridge (22) located on said finger with a first ramp (24) extending longitudinally from said ridge (22) towards said projection (10) forming a valley therebetween; utilising at least: a movable side mould (16) to form the recess, and to be part of mould to form the finger; and a central core (19) to form the bore (5) and the underside of said finger (9) and containing a recess (29) to receive the movable mould (16); and wherein after the movable side mould (16) is withdrawn, on withdrawing of the central core (19), the portion (23) of the central core (19), forming said valley of the underside of said finger, bears on the first ramp (24) and as the central core (19) is removed forces the projection (10) clear of the central core (19) whereby the projection (10) remains free of the core (19) at least until after the recess (29) in the central core (19) has passed the axial position of

the projection (10).

The connector of the present invention can be utilised to produce connections with any form of fittings, such as elbows, junctions, Y and T pieces, terminators, junction boxes, or fittings joining corrugated piping to rigid piping or corrugated piping to corrugated piping.

The present invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 illustrates a perspective view of a connector which is made in accordance with an embodiment of the present invention;

Figure 2 illustrates a sectional view of the connector illustrated in Figure 1 with a corrugated conduit connected therein; and

Figures 3a, 3b and 3c are part sectional views illustrating steps in accordance with an embodiment of the present invention in the moulding of the locking means of the connector shown in Figure 1.

A connector made in accordance with one embodiment of the present invention is illustrated in Figures 1 to 3 of the accompanying drawings. The connector (1) comprises a housing (2) having an open end (3) for insertion of the corrugated piping to effect connection thereto. The other end (4) is shown for threaded connection to a junction box or the like. However, this end could be designed for any type of connection or fitting. The bore (5) is chosen so as to be slightly oversize to the outer diameter of the corrugated flexible tubing.

The bore (5) as shown in Figure 2 has a tapered section (6) located, remote from the end (3) and terminating in an annular shoulder (7), with a smaller diameter bore (8), in communication therewith. The shoulder could be of any desirable width.

Located intermediate the ends of the bore, in the constant diameter section, are two resilient locking members or axially extending resilient fingers (9) formed in the walls of said bore (5), and having projections (10) which extend into the bore (5).

Thus, in clamping the connector (1) to a corrugated flexible piping as shown in Figure 2, the piping is pushed into the bore (5); the projection (10) being so shaped that the corrugations bear on the ramp (11) and force projections (10) back out of the bore. The piping is then pushed into the tapered section (6) where it may abut against the annular shoulder (7). As the piping is forced further into the tapered section (6), the piping is compressed by the increasingly narrowing diameter of the tapered section, to form a liquid tight seal therewith. The projections (10) lock into a valley of the corrugations of the piping, such that the face (12) of the projection abuts up against a ridge of the corrugations, to prevent the piping from being withdrawn from the bore (5); the ridges being in a liquid tight seal against the walls of the tapered section.

In another form of the connector the tapered section of the bore could be replaced by a resilient seal (27) (shown in Figure 2) which abuts against the end of the conduit or against

the walls to form a liquid tight seal or the resilient seal could be utilized as well as the tapered section described before.

To assist in the working of the locking members (9), there is a recess (13) as shown in Figures 1 and 2 which produces a thin walled section joining the locking members to the connector. This greatly increases the resilience of the locking member, such that if the conduit is attempted to be removed, the force of the corrugations on the face (12) produces a bending moment on the locking member, drawing the projection (10) deeper into the valley of the conduit, to prevent withdrawal of the conduit from the connector.

With the above described locking means, the corrugated piping may be released by means of a suitable tool inserted in the opening (14), to force the projections out of the bore (5).

The present invention may be made from any suitable plastics such as PVC or nylon, polypropylene, ABS, and can be used with pipes of varying sizes, for example, flexible plastic corrugated electrical conduit. The connector, as described above, can be utilised to form any desired connector, and could have any desired number of locking means as required.

The connector of the present invention could be moulded to a wall or a portion of a junction box, which wall or portion is releasably held in liquid tight relationship with the junction box, i.e. a groove and mating projection, or be able to be connected to a recess in a junction box by any suitable means, such as tapered swaged fit.

An embodiment of the method of the present invention will

now be described by way of example with reference to Figures 3a, 3b and 3c, which shows a part sectional view of one form of a connector in the area of the locking member during moulding.

The external mould (15) comprises a moving core (16) which forms the U-shaped cut-out (17), as shown in Figure 1. This projection mates with a recess (29) in the internal mandrel or central core (19), as shown in Figure 3a, to form the locking member or finger (9).

In profile as shown in Figure 3a, the projection (10) extends into the bore (5) beyond the wall thickness (21), with the ramp (11) tapering back beyond the wall thickness, and rising again to the apex (22) at the level of the wall thickness (21), where it forms a ramp (25) which slopes to the recess (13).

When the material of the thus moulded connector has sufficiently solidified, the external mould (15) and its projection (16) are withdrawn as shown in Figure 3b and the core pin (19) is withdrawn in the direction of the arrow (28). As the core pin (19) is withdrawn the ridge (23) as it bears on the ramp (24) forces the locking member outwardly from the bore (5), such that when the ridge (23) of the core pin (19) bears on the apex (22), the projection (10) is well clear of the core pin (19). Engagement of the ridge (23) with the slope (25) of the locking member as shown in Figure 3c prevents the projection (10) from interfering with the core pin (19) as it is removed from the bore (5). This thereby ensures that the locking edge (26) of the projection (10) is not damaged by the core pin (19).

It shall be obvious to people skilled in the art that the present invention could be used with corrugated conduit of any profile or could be used with non corrugated pipes having a ridge running around the pipe at a suitable distance from the end. The connector has applications for connection of electrical insulation piping, pool filtration and vacuum connections, vacuum cleaners, irrigation corrugated piping and lawn mower cable protection.

Claims

1. A method of moulding of a hollow one-piece plastics article having a longitudinal bore, with a recess in said article communicating with said bore (5), and longitudinally extending finger (9) positioned in said recess (17) with a projection (10), extending into said bore (5) and having on its underside a substantially transversely extending ridge (22) located on said finger with a first ramp (24) extending longitudinally from said ridge (22) towards said projection (10) forming a valley therebetween; utilising at least: a movable side mould (16) to form the recess, and to be part of mould to form the finger; and a central core (19) to form the bore (5) and the underside of said finger (9) and containing a recess (29) to receive the movable mould (16); and wherein after the movable side mould (16) is withdrawn, on withdrawing of the central core (19), the portion (23) of the central core (19), forming said valley of the underside of said finger, bears on the first ramp (24) and as the central core (19) is removed forces the projection (10) clear of the central core (19) whereby the projection (10) remains free of the core (19) at least until after the recess (29) in the central core (19) has passed the axial position of the projection (10).
2. A method of moulding a hollow article according to claim 1 wherein there is an external mould (15) as well as a separately movable side mould (16).
3. A method according to claim 1 or 2 wherein said central core (19) has means to hold said finger when said side mould or said side mould and said exterior die are removed.

4. A method of moulding a hollow one-piece plastics article substantially as hereinbefore described with reference to the accompanying drawings.